

# The EU 6<sup>th</sup> FPW Support Specific Action **HOTLABSSA**

## A new step towards an European Network of hot laboratories

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### Abstract

The general objectives are to reinforce European Hot Laboratory experimental capabilities by building a durable cooperation and a network between European hot laboratories for sharing facilities, and to assess their research capacity and their aptitude for supporting nuclear industrial and research community both at present and in the future.

A first step towards such integration was performed within the HOTLAB Coordination Action in FP6 (ended June 30 2005) where mainly an inventory of the present hot laboratory installations throughout Europe was performed, a web portal created and harmonization of nuclear transport started.

A second step would be an Integrated Infrastructure Initiative I3 which could be proposed for the FP7 (HOTLABINST – European Hot laboratories Integration Strategy).

However considering that:

- A close following-on project should be launched in order not to loose the momentum created by the HOTLAB CA project,
- In the last HOTLAB CA, some tasks such as training, trans-national access (mobility, exchange) to infrastructures could not been performed due to a limited amount of funding,
- A formal framework is essential to maintain the present exchange/information spirit and to further elaborate the future deepening of the cooperation,

a **HOTLABSSA** Specific Support Action in the FP6 running on 12 months has been submitted to the last EURATOM call of FP6 (April 2006).

The main objectives are:

- to improve the web portal created in the HOTLAB CA,
- to emphasize inter-laboratory test comparisons and personnel exchanges,
- to prepare the future FP7 HOTLABINST I3 project and finalize the proposal within the framework of a Topical Information Meeting open to all potential partners.

This support proposal, aiming at launching an integrated hot laboratories research area, meets the Specific Support Action as defined by the European Commission as it contributes to the implementation of activities in the work programme and specially the preparation of future activities.

## 1 Introduction

All over Europe national research hot laboratories are operated to ensure safe, durable and beneficial exploitation of nuclear applications, ranging from energy producing power plants to technological and medical applied radioisotopes. Furthermore, they play a key role in the development of new, innovative applications, which emerge from the growing knowledge being acquired. Finally they keep watch over public health protection for nuclear related hazards.

It is very important for the hot laboratories' community to install a framework for the European hot laboratories in order to build a common strategy for future research capacity on radiotoxic material R&D. Networking activities and joint research activities will be carried out to enlarge and reinforce the integration process.

The ultimate goals are as follows:

- The basic prerequisite to grow towards integration would be a dialogue platform specifically designed for the purpose of integration, i.e. a central unique recognized forum that is easily accessible by all concerned parties in a highly dynamic and interactive manner. It should be a catalyst for the mutual co-operation between the consortium of participants as well as to foster a culture towards co-ordination of new instrumentation, methods, concepts and technologies in response of the research demands. The HOTLAB website with its highly dynamic remotely operated inventory of hot laboratories capacities and needs, created in the former HOTLAB CA project, would be improved and extended to new hot laboratories partners. Hence, it would be maintained on a permanent basis to serve as a reference platform for preparing joint European research activities and could allow the knowledge dissemination and public information.
- Exchange of materials and personnel between hot laboratories would be facilitated, to provide education and training, to maintain competences, to harmonize and standardize working methodologies, and to assess mutual complementarities and accessibility,
- Definition and execution of HOTLAB tests in order to improve quality would be promoted. Standard calibration practices are often impossible to apply in the specific circumstances of a hot cell and HOTLAB tests are well suited to control the "fit for purpose" of the different modified analyses methods applied in individual hot laboratories,
- Research activities focusing on developments and fabrication of innovative PIE or instrumentation could be developed,
- Transport procedure will be worked out, both from administrative (materials accountancy, contamination limits, national and institutional regulations and administrative forms) and technical (samples conditioning, decontaminations practices, leak testing procedures) points of view.

This will:

- facilitate the transfer of radioactive samples between the different nuclear facilities;
- reduce the transport costs and delays;
- hence allow maximum synergy between different hot laboratories to become a reality.
- links could be reinforced with :
  - MTR+I3 (Material Testing Reactor) project in order to enhance the relationships between people in charge of experiments on radioactive materials (for instance improvement of transport issues, e.g. hatch compatibility),
  - ACTINET project in order to allow inter-hot laboratory test comparisons.

However considering that:

- a close following-on project should be aimed at in order not to lose the momentum created by the HOTLAB CA ( FIO6-CT-2003-508850) project running from 1/1/04 to 30/06/05;
- in the last HOTLAB CA, some tasks such as training, trans-national access like mobility or exchange to infrastructures could not be performed due to limiting amount of funding (/initial expression of interest),
- a formal framework and practical realization are indispensable to maintain the present exchange/information spirit and to further elaborate the future deepening of the cooperation,

a Support Specific Action "HOTLABSSA" has been proposed in the FWP6 EURATOM open call [[Nuclear Horizontal activities for management of radioactive waste, radiation protection and other activities FP6-NUCHORIZ-2003-3-5-1](#)]- limited submission date : 11 April 2006.

## 2 Objectives of the proposed project HOTLABSSA

The main goals are :

- To improve the existing website created in the last HOTLAB CA by
  - giving in particular more general information on hot laboratories especially for non specialist people (what is a hot laboratory? what is it used for? How to be protected from radiation or from contamination? What is the final destination of wastes?),
  - making the web site more visible and accessible by search engines.
- To start a reflexion allowing to draw up a complete list of the inter-laboratory test comparisons we could carry out or perform within the future HOTLABINST I3 project FP7 with ,
  - making a first list of the inter-laboratory test comparisons we could perform on non irradiated materials only according to transport difficulties for irradiated materials;
  - making a second list of the inter-laboratory test comparisons we could perform on irradiated materials; it could be tests which have already gained a lot of interest in the scientific community like for instance Round Robin test on EPMA (Electron Probe Micro Analysis) to compare the methodology for actinide materials.
  - choosing one of them in the first list.
  - launching the procedure for practical realization of the test chosen (technological, legal, transport aspects),
- To list all potential themes of collaboration where personnel exchanges between the different hot laboratories involved in the future HOTLABINST I3 project could be implemented and to launch the procedure for the practical realization of one of them (technological, legal aspects),
  - It could be a theme which has already gained a lot of interest in the scientific community like for instance mechanical testing (SCK and CEA very interested by toughness testing: CT or PCCv) on miniature specimen. Indeed testing of such miniature specimen in hot cell is a real challenge that requires a lot of expertise, handiness and skill.
  - The ultimate objective is to provide practical means for education and training of hot laboratories personnel by sharing experience on common infrastructure matters and specific analytical tools. The exchange of personnel for education and training purposes will provide the basis for skill enhancement and skill conservation, promoting and enabling the harmonisation and future integration of existing facilities.
- To prepare the future HOTLABINST I3 project by organizing some intermediate meetings and by finalizing the future FP7 proposal within the framework of a Topical Information Meeting which could be organized in parallel of the yearly conference "Hot laboratories and remote handling", planed to be held in 2007 in ROMANIA.
  - This Topical Information Meeting would be of course opened to all participants of the last HOTLAB CA, but also intended to other laboratories like for instance VTT in Finland, Studsvik in Sweden, AMI Chinon in France, the COGEMA laboratory in Marcoule, France, etc.

## 3 Project management

This HOTLABSSA Project proposal has been presented with a duration of 12 months.

Four mains Work packages in the HOTLABSSA have been proposed and are as follow:

- WP1 /the website upgrading (societal impact),
- WP2 /I3 HOTLAB tests preparation phase (quality and excellence level impact),
- WP3 /I3 personnel exchange preparation phase (training, mobility impact),

- WP4/ Preparation of the FP7 HOTLABINST I3 project proposal.

As the project's joint programme of activities is straightforward, i.e. composed of 4 individual independent work-packages, and limited in volume and corresponding budget, the management of this co-ordination action will be structured in a simple straightforward manner :

1. the steering committee:
  - composed of the coordinator (CEA) and the representatives of each organization to enable firm commitments for work-package contents and appropriate resources;
2. for each work-package a task group is being set up:
  - composed of a WP-leader & members who are responsible for the practical implementation and execution of the work-package;
3. the coordinator is CEA\*, who
  - makes the co-ordination of the project within the EC 6<sup>th</sup> FWP,
  - manages on a daily basis the project and co-ordinates the different work-packages according the guidelines from the board,
  - forms the central interface of the project with the outside world.
4. the partners

Only five participants have been proposed in the HOTLABSSA although 19 participants were involved in the last HOTLAB CA in order to be more efficient as the duration of this kind of tool is very limited (only 12 months).

The different arguments for the choice of these participants are :

- SCK/Belgium, because the last coordinator of the HOTLAB CA came from this center and the website is hosted by <http://www.sckcen.be/hotlab/> and is maintained up to now by them,
- AREVA NP GmbH/Germany, because their high interest in inter-laboratory test comparisons and personnel exchanges (needs of fully educated people to do measurements on commercial rods), they were in charge of the Work Package 2 "present and future needs" in the last HOTLAB CA, and are representative of both hot cells and nuclear fuel industry. Having an industrial end-user shows the relevance of the project.

Both played a major role in the last HOTLAB CA management plan.

- RAAN-SCN/Romania, because they are in charge of the organisation of the 2007 yearly conference "Hot laboratories and remote handling", we propose to couple with the Topical Information Meeting for preparing the HOTLABINST I3 project. They are representative of hot cells from Eastern Europe,
- PSI/Switzerland, because their high interest in the European HOTLAB integration as demonstrated by their highly active contribution towards the former HOTLAB CA and their strong interest in the personnel exchange as important issue to realise further on this integration,
- CEA/France, because their high interest in the European HOTLAB integration as demonstrated by their highly active contribution towards the former HOTLAB CA (e.g. WP3 leader), its motivation for personnel exchange, and proposes to be the Coordinator of the SSA.

#### **4 Relevance to the objectives of the Euratom Programme**

The European national hot laboratories stem from the sixties and have supported with success the implementation of nuclear energy during the 70ies and 80ies. The last decade, the high degree of maturity of conventional reactors and the rising public concern about nuclear, faces hot laboratories with more complex loads (i.e. advanced research tools in response to more fundamental research needs to feed actual in-depth modelling), reduced funding, refurbishment of aged basic infrastructure, a restricted new crew (the pioneers having retired) and an increasing stringent environment (to comply with the more stringent requirements of the regulatory authorities).

On the other hand, the safe and economic exploitation of existing conventional reactors, including fuel cycle back end issues (waste disposal, partitioning and transmutation), the exploration /development of advanced nuclear energy systems (4<sup>th</sup> generation fission reactors and future fusion machines) as well as a broader application of radioisotopes (e.g. for medical purposes) call for highly dynamic hot laboratory R&D capabilities, both on short and long terms (from decades to centuries).

It is generally recognized that it is not possible to cover all aspects of nuclear materials research, and to dispose of all types of examination methods in a single laboratory. Maintaining on a longer term sufficient critical mass of expertise and infrastructure on remote handling and radioactive materials research will not be possible without increased efforts to promote collaboration between the presently existing hot laboratories.

The compilation of available capabilities aims to integrate national laboratories, helping to restrict redundancies and serving to set up mutual accessible complementary facilities in the long term. The assessment of present and future needs in the nuclear field and harmonisation and standardisation of research methodologies and capabilities will assist the harmonious development of resources in Europe.

All nuclear R&D, hence by evidence all thematic priorities of the Euratom Research and Training Programme on Nuclear Energy, rely on remotely operated R&D infrastructures, i.e. hot laboratories for the obligate experimental part.

A first step towards such integration was performed within the HOTLAB CA project (Contract FIO6-CT-2003-508850) where a digital catalogue of European hot lab capacities, including transport casks, was set up and where present and future R&D needs were assessed. The project has provided structural measures which are by definition long lasting, hence allowing integration to proceed further at longer term.

By reinforcing existing experimental hot laboratories capabilities and by integrating hot laboratories' community, HOTLABSSA project (where pilot actions on inter-laboratory tests and personnel exchange are proposed) is an indispensable step toward a European Research area infrastructure policy in the fission, partitioning/transmutation, fusion domains.

## 5 Potential impact

### - *Website upgrading:*

Nuclear energy plays a vital role within the European Union. It represents one third of Europe's electricity consumption, and 13 member States operate a total of 155 nuclear reactors to produce electricity. Most of the other member States import nuclear-generated electricity.

Nuclear industry cannot be maintained without a consensus of public opinion. Clearly, such a consensus is only possible if a satisfying solution to certain key issues related to safety and security can be found, with the greatest transparency.

For Europe, the sensitive subjects (industrial, nuclear and health hazards) have emerged as major themes in energy and environment policies. It is clearly necessary now to tackle them within a European perspective, for the scientific community is conducting its work within an international framework, and energy regulations are, essentially, established at the European level. These decidedly complex issues call for great efforts in information and in scientific vulgarisation for non specialist people and their elected representatives, quite legitimately worried. The European projects must take local acceptance into account. It is important for all countries to integrate this local dimension and to respect true transparency and communication.

It is the objective we propose to attain by improving the web site of HOTLAB (mainly, addition of a description of what is really a hot laboratory, and what are the main safety requirements associated in order to make it more user-friendly to non specialist public).

*- I3 personnel exchange and HOTLAB test preparation phases*

The launching of the procedure for the first inter-laboratory test comparisons and the first exchange of personnel will allow establishing on common views and practices for designing and running round robin tests. It will allow to share the effort of optimisation and to improve the quality.

Exchange of practical knowledge on common infrastructure allows improving the competence of hot laboratory collaborators and standardising if possible the work procedures between institutions (as examples : scientific interests on Electron Probe Micro Analysis. and mechanical testing on miniature specimen round robin)

Exchange of practical knowledge on specific analytical tools allows to develop new analytical methods for investigation of radioactive materials and to make easier the validation of these methods.

Challenging developments will be an effective way to attract a young generation of scientists and engineers. Furthermore, it will help to increase the reciprocal trust and confidence in the quality and responsibility of the experts and workers in the European countries.

Experience acquired through ACTINET personnel exchanges will be used for the benefit of HOTLABSSA project.

A trans-national access (mobility, exchange) is really promoted.

Together with the future training programme proposed with the network and the future I3, this will prepare future European experts and managers.

## **6 CONCLUSION**

In order not to loose the momentum created by the last HOTLAB CA FP6 project (Contract N° FO6O-CT-2003-508850 running from 1/1/2004 to 30/6/2005), a formal framework is essential to prepare and finalize the future FP7 HOTLABINST European (Hot laboratories Integration Strategy ) project proposal.

It is the aim of the HOTLABSSA project running on 12 months submitted on the last open call of FP6.

The general objectives are to reinforce European Hot laboratory experimental capabilities by building a durable cooperation and a network between European hot laboratories and to assess European hot laboratories research capacity and its aptitude for supporting nuclear industrial and research community both at present and in the future. The ultimate goal is to preserve appropriate nuclear research infrastructure in Europe by combining the best available competences at the highest quality.

The HOTLAB network will also endeavour a synergetic integration of the dispersed knowledge and infrastructure as present within individual national hot laboratories. Assessment of available capacities and their quality assurance, exchange of personnel and materials, and perception and appropriate anticipation to present and future research needs will allow endeavouring towards a European integrated hot laboratory research infrastructure. It will aim to restrict redundancies, to make use of consistent appropriate complementarities with mutual accessibility, and to make more easily introduced highly specialized expertise and infrastructure in response to the needs of the nuclear community.